

"Made available under NASA sponsorship  
in the interest of early and wide dis-  
semination of Earth Resources Survey  
Program information and without liability  
for any use made thereof."

E7.4-10738

-CR-13962F

EVALUATION OF ERTS-1 IMAGERY IN MAPPING AND MANAGING  
SOIL AND RANGE RESOURCES IN THE SAND HILLS REGION OF  
NEBRASKA

Paul M. Seevers and James V. Drew  
Department of Agronomy  
University of Nebraska - Lincoln  
Lincoln, Nebraska 68503

August, 1974  
Type II Report for Period January 1, 1974 to June 30, 1974

Prepared for  
GODDARD SPACE FLIGHT CENTER  
Greenbelt, Maryland 20771

(E74-10738) EVALUATION OF ERTS-1 IMAGERY  
IN MAPPING AND MANAGING SOIL AND RANGE  
RESOURCES IN THE SAND HILLS REGION OF  
NEBRASKA Semiannual Progress Report, 1  
(Nebraska Univ.) 11 p HC \$4.00 CSCL 08B

N74-32767

Unclas  
G3/13 00738

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Evaluation of ERTS-1 imagery in mapping and managing soil and range resources in the Sand Hills Region of Nebraska		5. Report Date August 15, 1974	6. Performing Organization Code
		8. Performing Organization Report No.	
7. Author(s) Paul M. Seevers and James V. Drew		10. Work Unit No.	
9. Performing Organization Name and Address Dept. of Agronomy University of Nebraska Lincoln, Nebraska 68503		11. Contract or Grant No. NAS5-21756	
		13. Type of Report and Period Covered Type II Report January 1, 1974 to June 30, 1974	
12. Sponsoring Agency Name and Address Goddard Space Flight Center Greenbelt, Maryland 20771 G. Richard Stonesifer, Technical Monitor		14. Sponsoring Agency Code	
15. Supplementary Notes			
16. Abstract Ground truth collection involving field measurements of vegetative biomass on specific range sites in the north-central portion of the Sand Hills region was continued. Computer programs are being developed and modified to use radiance values obtained from CCT's in measuring vegetative biomass on known range sites. Construction of a soil association map for the entire Sand Hills region is in progress using 1:250,000 enlargements of snow-enhanced ERTS-1 imagery. Cooperation with the Great Plains corridor project administered by Texas A&M University is being continued.			
17. Key Words (Selected by Author(s))		18. Distribution Statement	
19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*

\*For sale by the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

Figure 2. Technical Report Standard Title Page

## Preface

This report covers the period January 1, 1974 to June 30, 1974 for the investigation evaluating the use of ERTS-1 imagery in mapping and managing soil and range resources in the Sand Hills region of Nebraska (MMC 020, James V. Drew, Principal Investigator, GSFC Identification Number UN-062, NASA Contract Number NAS5-21756).

Collection of ground truth for range sites in the Valentine area within the north-central portion of the Sand Hills region is being continued. Forage density data from 1 square meter plots and ground photos in color are taken, concurrent with each satellite overpass.

Initial stages of computer manipulation of data are being examined. A computer compatible tape, obtained by retrospective order, has been placed in the University of Nebraska's IBM 360 computer and programs are being modified to produce data in the required form for forage density evaluations.

Initial stages of development of a soil association map for the entire Sandhills region have been completed. Attempts to delineate the associations at a scale of 1:500,000 did not allow for adequate detail to be seen for smaller areas. County areas at a scale of 1:125,000 will be delineated, combined and reduced for a region-wide map.

Cooperation with the Texas A & M Great Plains Corridor project (MMC 667) was extended to July 1, 1974. Forage density measurements, field observations and climatological data were provided for the period.

## Introduction

This report describes data evaluation and ground truth collection during the period January 1, 1974 to June 30, 1974 for contract NAS5-21756. Areas of activity include (1) collection of ground truth, (2) familiarization with computer manipulation of data, (3) soil association maps for Sandhills region, (4) cooperation with Texas A & M Great Plains Corridor project, and (5) preparation of final report.

## Ground Truth Collection

Collection of ground truth from study sites in Cherry County, Nebraska was continued. Clipping data from one square meter plots were taken. Fresh weights, dry weights, utilization and ground photographs were taken for each sampling period. Additional observations and color photographs are taken for selected features and areas of the region for general interpretation. A severe lack of rainfall in some areas has substantially reduced forage production. Close monitoring of these areas will be necessary to attempt to prevent serious wind erosion problems.

## Computer Manipulation of Data

One set of computer compatible tapes, retrospectively ordered, has been used to initiate computer manipulation of ERTS-1 data. Programs provided by Dr. Jane Schubert, NASA, GSFC, are being modified to provide the most usable data output for our purposes. Precision location of data points for geographic coordinates has been most difficult to achieve. Radiance value clustering and manipulation of band ratios appear to provide meaningful data with reference to forage density evaluation.

### Regional Soil Association Map

Previous development of soil association mapping techniques using summer imagery for vegetative interpretations and winter imagery with snow cover and low sun angle has permitted construction of a soil association map for the entire Sandhills region. Since soils maps made by conventional techniques do not exist for a large portion of the region, this association map will provide a uniform basis for soil resource interpretations across the region. It will also provide information for those areas where no recent survey exists.

Attempts to map associations on 1:500,000 enlargements of ERTS-1 imagery revealed difficulties in distinguishing sufficient ground detail, particularly on the winter scenes. The more subtle changes in topography were more apparent on enlargements of 1:125,000 and these enlargements are being used to construct a soil association map for the entire Sand Hills region.

### Cooperation with Texas A & M

Contact with Texas A & M Great Plains corridor project (MMC667) personnel indicated a need for data until July 1, 1974. Standardized data collection procedures were carried out for the Great Plains corridor project until the satellite overpass of July 7, 1974. Forage density in the form of clipping data from one square meter plots was provided for each satellite pass beginning May 9, 1974. Additional field observations concerning vegetative stages of growth, grazing utilization and color photographs were also provided. Climatological data from the nearest reporting station was gathered and forwarded.

## Final Report

Preparation of a final report for this project has been initiated.

## Program For Next Reporting Period

The program for the next six months will involve a continuation of current activities. Acquisition of ground truth involving vegetative biomass will continue. Clipping data, ground photographs and other observations will be collected for selected areas.

A region wide soil association map will be constructed based on visual interpretations of 1:250,000 enlargements of ERTS-1 imagery. The individual areas will then be combined to produce a regional map at a larger scale.

Manipulation of computer data for estimates of vegetative biomass will be continued. It is anticipated that range site categories as well as forage density maps can be produced with proper radiance clustering and ratio analyses.

## Conclusions

It is feasible to produce a soil association map of the entire Sand Hills region utilizing spring imagery for vegetative interpretations and winter imagery with snow cover and low sun angle for topographic interpretations.

It appears likely that forage density and range site category maps can be generated for the sandhills region from computer compatible tapes by radiance values clustering and band ratio manipulation. Production of this type of data by computer presents the possibility of real time range evaluation, which is essential if ranchers and range managers are to effectively use ERTS data for management decisions.

### Recommendations

No recommendations are being offered at this time.

### Publications

Seevers, Paul M. 1974 Forage density estimation and soil association mapping in the Sandhills of Nebraska from remote sensing data. Proceedings of the Nebraska Academy of Sciences, Lincoln, Nebraska p. 35.

# ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

DATE June 30, 1974

PRINCIPAL INVESTIGATOR J. V. Drew

GSFC UN-062

ORGANIZATION University of Nebraska

NDPF USER ONLY

U. \_\_\_\_\_

N. \_\_\_\_\_

ID. \_\_\_\_\_

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Cropland	Rangeland	Dunes	
1566-16571-7		X		REPRODUCIBILITY OF THIS ORIGINAL PAGE IS POOR
1562-16350-5	X			
1582-16453-M	X			
1600-16451-6	X			
1600-16451-7	X			
1600-16453-6	X			
1600-16453-7	X			
1600-16460-7	X			
1599-16393-M	X			
1599-16395-4	X			
1599-16395-6	X			
1599-16395-7	X			
1586-17082-M		X		
1586-17084-M		X		
1586-17091-M	X			
1585-17024-M		X		
1585-17030-M	X			
1585-17033-M	X			
1598-16334-M	X			
1598-16341-M	X			
1604-17080-M		X		
1604-17083-M		X		
1602-16572-4	X			
1602-16572-6	X			
1602-16572-7	X			
1601-16505-4	X			
1601-16505-6	X			
1601-16505-7	X			
1601-16512-4			X	
1601-16512-6			X	
1601-16512-7			X	
1601-16514-4	X			

\*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO      NDPF USER SERVICES  
 CODE 563  
 BLDG 23 ROOM E413  
 NASA GSFC  
 GREENBELT, MD. 20771  
 301-852-5705



## ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

DATE June 30, 1974PRINCIPAL INVESTIGATOR J. V. DrewGSFC UN-062ORGANIZATION University of Nebraska

NDPF USE ONLY

D \_\_\_\_\_

N \_\_\_\_\_

ID \_\_\_\_\_

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Cropland	Rangeland	Dunes	
1601-16514-6	X			REPRODUCED ORIGINAL PAGE 28
1601-16514-7	X			
1567-17025-6		X		
1622-17074-6		X		
1567-17034-6	X			
1621-17020-M		X		
1621-17022-M	X			
1621-17025-M	X			
1620-16561-M		X		
1620-16564-M			X	
1620-16570-M	X			
1638-16555-M		X		
1638-16561-M			X	
1638-16564-M	X			
1618-16445-M	X			
1618-16451-M	X			
1618-16454-M	X			
1635-16384-4	X			
1635-16384-5	X			
1635-16384-6	X			
1617-16393-M	X			
1635-16390-M	X			
1634-16330-4	X			
1634-16330-6	X			
1634-16330-7	X			
1634-16332-4	X			
1634-16332-6	X			
1634-16332-7	X			
1634-16335-4	X			
1634-16335-6	X			
1634-16335-7	X			
1615-16280-M	X			

\*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO NDPF USER SERVICES  
CODE 563  
BLDG 23 ROOM E413  
NASA GSFC  
GREENBELT, MD. 20771  
201-621-6413

# ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

DATE June 30, 1974

PRINCIPAL INVESTIGATOR J. V. Drew

GSFC UN-062

ORGANIZATION University of Nebraska

NDPF USE ONLY

D \_\_\_\_\_

N \_\_\_\_\_

ID \_\_\_\_\_

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Cropland	Rangeland	Dunes	
1615-16283-M	X			
1633-16271-M	X			
1633-16274-M	X			
1633-16280-M	X			
1637-16501-4	X			
1637-16501-6	X			
1637-16501-7	X			
1637-16503-7			X	
1637-16510-6	X			
1616-16335-5	X			
1616-16335-6	X			
1616-16335-7	X			
1616-16341-M	X			
1597-16280-M	X			
1597-16282-M	X			
1637-16503-6				
1615-16283-M				
1550-17100-M	X			
1568-17084-M		X		
1568-17090-M		X		
1568-17093-M	X			
1584-16565-M		X		
1583-16511-M	X			
1583-16520-M	X			
1582-16455-M	X			
1582-16462-M	X			
1581-10394-M	X			
1581-16401-M	X			Snow cover
1581-16403-M	X			Snow cover
1561-16292-M	X			
1564-16461-7	X			
1564-16463-7	X			
1564-16454-7	X			

\*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO      NDPF USER SERVICES  
 CODE 583  
 BLDG 23 ROOM E413  
 NASA GSFC  
 GREENBELT, MD. 20771  
 301-982-5405

(See Instructions on Back)

ORGANIZATION University of Nebraska

ID \_\_\_\_\_

\*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

6.4C.3/2 (7/72)